BITTERROOT TECHNICAL ADVISORY COMITTEEE (TAC)
1st MEETING: APRIL 15, 2005
MEETING NOTES

Attendees:

Terry Carlson	USFS Hydrologist
Michael Kasch	HDR Engineering, Inc.
Pat O'Herren	Ravalli County Planning Director
Rob Ahl	UM Modeling Lab
Jon Harvala	Missoula County WQD
Travis Ross	Missoula County WQD
Phil Farnes	Montana State University
Brian Sugden	Plumb Creek Timber
Scott Woods	UM Forestry Department
Pete Schade	DEQ Bitterroot TMDL Project Manager
John LaFave	MBMG Hydrogeologist
Harvey Hackett	BRID Board of Directors
Kevin Hyde	Rocky Mountain Research Station
Michael Pipp	DEQ Clark Fork Program Manager

Bitterroot TAC (SWAT)

Questions/Requests:

Patrick O'Herren → Requested flow chart showing players, pieces, relationships (describing the TMDL process)?

RESOLUTION: DEQ will look into putting information together.

HRU Discussion:

Brian Sugden → Question regarding locations of HRU's (streamside vs. ridge top).

RESOLUTION: SWAT is spatial distributed through the use of subbasins, not HRU's. The HRU units within each subbasin are not spatially referenced (e.g. it does not matter if it is at the edge of a stream or top of the ridge).

Kevin Hyde → Can you map HRU assignment?

RESOLUTION: SWAT can indirectly display the location of the HRU through GIS analysis techniques. However, it is not explicitly defined in the structure of the model.

Scott Woods → Subbasins based on 303(d) list? Is this to coarse?

RESOLUTION: Delineation based on DEQ objectives. Subbasin discretization will be discussed later.

Pat O'Herren → HRU is the "heart of the model".
-Can the output of the forest be altered by urban areas?

RESOLUTION: Routing of the model is based on stream connectivity so upstream quality cannot be affected by downstream practices. However, the model does assume that each HRU load is placed at the top of the subbasin channel and routed through the rest of the

watershed. Provisions need to be made to ensure that stratified management practices (e.g. the progression from forested, to agricultural, to urban) are not dampened by scalar issues.

Kevin Hyde → The TAC needs to be careful how model use, application, and objectives are communicated to public. This includes how and why the model is used

Kevin Hyde → Research station going public with "Fire" model - should be able to lend some experience to the group regarding public/TAC interaction.

Pat O'Herren → Please do not ever show a worldwide application map in valley (in regard to the SWAT modeling application and governmental fears).

Calibration/Verification:

Rob Ahl → Recommends choosing calibration period and then running model at least 5 years prior to calibration year (ie. '96→2000 run for 2000 Calibration year).

RESOLUTION: It was agreed upon that a mandatory "model warm up period" is required to equilibrate soil moisture prior to model analysis. A representative period (wet/dry) or previous measured meteorological data will be used for this purpose.

Brian Sugden → Are there model criteria requirements for model parameters?

RESOLUTION: A modeling Quality Assurance Project Plan (QAPP) has been developed for the Bitterroot project to outline the quality of data required for model parameterization as well as calibration/verification. The QAPP defines acceptable criteria for modeling data and acceptance criteria for model calibration and verification. Model parameters will not be varied outside that of the literature for analysis in the Bitterroot.

Kevin Hyde → Sensitivity analysis - which parameters are the most critical?

RESOLUTION: Sensitivity analysis will be completed as part of the modeling exercise. Several papers on model sensitivity are available at the SWAT website.

Kevin Hyde → How will you correlate calibration points to subbasins for calibration?

RESOLUTION: The three calibration points are located at USGS gaging sites. Each site has continuous discharge and quality data available.

Rob Ahl → Suggested calibration model for years up to 2000 (~1990-2000)
- Land cover was stable during those periods
- Then run the model for post-2000

RESOLUTION: DEQ will determine the calibration period as the data compilation deliverable becomes available from the modeling contractor. If data is available, the suggestion seems very reasonable.

Modeling Data:

Phil Farnes → Data on surface hydrology.
- NRCS has discharge at Skalkaho Creek
- Has daily inflow/outflow at Painted Rocks
- USGS/USFS has Skalkaho Q post; 1935-2004

- NRCS – Burnt Fork; 20 + years post USGS data
- Burnt Fork Lake storage in 1980's
- Skalkaho good indicator for east-side streams

Terry Carlson → USFS data available only from National Forest lands.
- Bitterroot – various Q, SED, X-section data from 1990's
  - Contained in non electronic format/multiple spreadsheets
  - Collection QA good and documented

Kevin Hyde → New landcover data set available for region.
- "VMAP" based on SILC
- SILC 1 1992, SILC2, SILC3 1996 refined

Groundwater Hydrology/Septic:

Brian Sugden → How are subsurface flows and septic loading accounted for?

RESOLUTION: Subsurface routing in SWAT is completed using GLEAMS (Groundwater Loading Effects of Agricultural Management Systems) which is an algorithm developed by the ARS to track saturated and unsaturated zone hydrology. Septic loads will be simulated using a fertilizer application at depth, based on the constituency of effluent in the area. The relative contribution of septic loading will be based largely on septic density.

Kevin Hyde → Septic data identification - Montana Cadastral GIS/Web has parcel level data information and development patterns. Development areas/locations.

Pat O'Herren → Septic data identification - Ravalli City Planning Office feeds MT Cadastral
- Community WWTP systems
- Community Water systems
- Cadastral layer does not show multi-units/parcel
- Unclear if septic failure rates are known ~ contact Teresa at Ravalli County

Jon Harvala → Septic data sources - Hamilton aerial flights. Additionally:
- CAMA data
- Multi dwellings/parcel
- Request citywide specific data from planning office

RESOLUTION: DEQ/HDR will request data from the necessary sources to properly model septic loading. DEQ/contractor will work with the TAC collectively to identify best approach and consolidate pertinent data when required for modeling.

Surface Water Hydrology:

Harvey Hackett→ How will intermittent stream flow be modeled? Nutrient loads?

RESOLUTION: SWAT algorithms account for all aspects of the hydrologic cycle including baseflow in the form of groundwater/shallow aquifer recharge. If baseflow is not present, a stream system is ephemeral. Because the model is based on a daily time step (e.g. daily measured rainfall drives the model response), the simulation of episodic events (ephemeral in nature) is possible. Pollutant loadings are directly tied to the hydrology so nutrient runoff pulses are also modeled.

Phil Farnes → Use USGS official names for gages.

RESOLUTION: DEQ will modify to official gage names.

Pete Schade → Are reference streams identified/available?

RESOLUTION: No specific reference streams were identified for the modeling effort. However, several 5th codes are delineated that are not impaired [303(d) listed] and could potentially serve as reference condition.

Phil Farnes → Would it be better to use measured melt values (snow melt regimes)?
- Saves hydrologic construction times
- Calibrate melt rate to hydrographic
- Model needs to hit point measurements or lose credibility

RESOLUTION: It is very difficult to directly incorporate observed snowmelt data into the SWAT model. However, model melt coefficients can be calibrated to observed melt rates. Additionally, melt coefficients can be varied over time so that melt rate changes over the course of a year (maximum and minimum melt rate at summer and winter solstices).

John LaFave → Irrigation influence/impact; how does model account for this?

RESOLUTION: The irrigation scheduling options within SWAT (withdrawl from subbasin reach, reservoir, shallow aquifer, deep aquifer, or basin transfer) were identified as potential simulation methods. Auto-irrigation options were also discussed, but will not be used in the modeling effort due to credibility concerns.

Harry Hackett → BRID has ongoing program to line canal – how will that affect simulation?
- Goal: eliminate all subsurface loss
- Normal water right: 1 miner inch/AC - BRID ½ mine inch/AC delivered

RESOLUTION: Transmission losses can be specified within SWAT stream reaches, however, there is no algorithm for canal losses or transmission to the shallow aquifer from interbasin transfers. Interbasin or canal losses would have to be determined independently.

Subbasin Discretization Discussion:

Phil Farnes→ Recommended starting with 6th field HUCS and aggregating from there.
- 2000 Fires snow melt runoff by 6th order HUC
- 1973 Bitterroot flow analysis report
- Start as fine as possible and aggregate up

Rob Ahl → Colleague in KS doing work on 800,000 ha basin. Using many subbasins.

Phil Farnes → Make certain to segregate east and west side hydrology.

Kevin Hyde → Are we limited by technology – could go to 3 nested models?
- What will be credible
- Too coarse versus too fine (balance data management/compilation)
- Need to consider the assumptions and limitations
- What is DEQ's objective
- What level of change is the model need to sensitive to
- Land scale/time scale considerations

Pat O'Herren → Must have public credibility!
- Do we need to phase project
  - 1st compile data
  - Take 2nd cut at modeling basins per critical scenario

Scott Woods → Basin delineation at 49; is this final or can we review?

Brian Sugden → USFS may be interested in upper portions (spatial-scalar issue)
- Various groups may be interested in differing scales (HRU/subbasin output)
- How should we address?

Terry Carlson → USFS work should be separate from this project.

Rob Ahl → Statistical tool available to calculate appropriate level of discretization.

Phil Farnes → Follow common watershed divides to match up with other studies.

Rob Ahl → Recommendation; some basins too big (general comments)
- Model just West Fork and determine the descretization necessary to calibrate.

Michael Pipp → Reiterate that the project was defined to meet DEQ's planning objectives
- e.g. the 303(d) listed streams of interest
- This needs to be kept in mind as discretization is further investigated.

RESOLUTION: DEQ will circulate the subbasin shapefiles and look for comments from the TAC. Changes will need to be justified in writing based on scientific methods. Possible areas for improvement that were identified during the TAC meeting include scalar issues surrounding urban centers, other monitoring locations where data may be sufficient for model calibration/verification, and the possibility of standardizing with 5th or 6th code HUC's.

TAC Format:

RESOLUTION: It was determined by the TAC to meet at key times/milestones and complete all other correspondence via web, email, or telephone communication.